

### REMARKS

By this Amendment, claims 1-20 are pending in this application, with claims 1, 8, and 15 being independent claims. Claims 1, 8, and 17 have been amended to more clearly define features of the present invention. No new matter has been entered.

Applicant gratefully acknowledges the Examiner's indication of allowable subject matter in claims 2 and 9. However, Applicant has not rewritten these claims in independent form to include all of the limitations of the base claim and any intervening claims because at least generic claims 1, 8, and 15 are patentably distinguishable over the cited prior art.

In the outstanding Office Action, the Examiner: rejected claims 1-14 and 17 under 35 U.S.C. § 112, second paragraph, as being indefinite; and rejected claims 1, 3-8, and 10-20 under 35 U.S.C. § 103(a) as being unpatentable over Matsumoto (JP 11-121196) in view of Suzuki et al. (EP 0880164) and Imahashi et al. (U.S. Patent No. 5,432,472).

Applicant respectfully requests reconsideration and withdrawal of the rejections set forth in the above-identified Office Action.

### REJECTIONS UNDER 35 U.S.C. § 112

The Examiner rejected claims 1-14 and 17 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner asserts that the use of term "rectangular waveguide" in claims 1, 8, and 17 is indefinite because it is unclear whether the "rectangular waveguide" is directed to the shape of

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the ring-shaped antenna waveguide, the cross-sectional area of the antenna waveguide, or the shape of the connecting waveguide. In response, Applicant has amended the claims to more clearly recite that the antenna waveguide has a rectangular radial cross-sectional area. Thus, reconsideration and withdrawal of this rejection is respectfully requested.

#### REJECTIONS UNDER 35 U.S.C. § 103(a)

The Examiner rejected claims 1, 3-8, and 10-20 under 35 U.S.C. § 103(a) as being unpatentable over Matsumoto in view of Suzuki et al. and Imahashi et al.

Applicant respectfully traverses this rejection.

Each of the claims is drawn to a different combination of structural components that is patentable over the teachings of the cited prior art. In particular, independent claim 1 recites a combination including, among other things, an antenna having a plurality of substantially ring-shaped and substantially concentric antenna waveguides, each of the antenna waveguides comprising a proximal end portion, a terminal end portion, and a wall having a plurality of slots formed at a predetermined interval, and a connecting waveguide for connecting a microwave supply source to the proximal end portion of each of the antenna waveguides. Independent claim 8 includes similar recitations. Independent claim 15 recites a combination including, among other things, an antenna having a plurality of substantially ring-shaped antenna waveguides, each of the antenna waveguides comprising a proximal end portion and a terminal end portion, a connecting waveguide for connecting a microwave supply source to each of the antenna waveguides, and the connecting waveguide having a closed terminal end

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portion and a plurality of side apertures for supplying the microwaves to each of the antenna waveguides.

While admitting the deficiency (e.g., the absence of any disclosure of a plurality of substantially ring-shaped antenna waveguides and a microwave absorber) in Matsumoto et al., the Examiner asserts that the disclosure of Suzuki et al. makes up for the deficiency of Matsumoto et al. The Examiner alleges that “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Matsumoto with a plurality of a ring-shaped antenna waveguides with apertures as taught by Suzuki” and that “this would allow microwaves to radiate over a large area and for a relatively uniform intensity distribution.” Regarding the recited microwave absorber in claims 4, 11, and 20, the Examiner further asserts that “it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the connecting waveguide and antenna waveguides of Matsumoto with a microwave absorber as taught by Imahashi.”

In response, Applicant respectfully submits that the Examiner’s assertions as to the cited prior art do not establish a proper *prima facie* case of obviousness under 35 U.S.C. § 103(a). It appears that the Examiner has improperly pieced various aspects of the present invention from the prior art together with a good deal of hindsight and with the invention as a road map to make an obviousness rejection.

“The examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability.” *In re Oetiker*, 24 USPQ 2d 1443, 1444 (Fed. Cir. 1992) (Emphasis original). Thus, the Examiner must follow the criteria necessary to establish a *prima facie* case of obviousness. To establish a *prima*

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*facie* case of obviousness, three basic criteria must be met. First, the prior art references when combined must teach or suggest all the claim elements. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Finally, there must be a reasonable expectation of success. M.P.E.P. § 2143.

Furthermore, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicants' disclosure. See *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Additionally, the evidence of a teaching, suggestion, or motivation to combine must be "clear and particular." *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999). As will be described below, combination of the cited references fails to establish a *prima facie* case of obviousness under 35 U.S.C. § S.C. § 103(a).

As to the first criterion for a proper *prima facie* case of obviousness, the combination of Matsumoto et al. and Suzuki et al. does not teach or suggest all the claimed elements. The teachings of Matsumoto et al. and Suzuki et al. have been fully discussed in the Applicant's last response filed on July 30, 2002. As specifically pointed out in the response, the Examiner fails to clearly set forth how and in what manner the teaching of Suzuki et al. are incorporated in the apparatus of Matsumoto et al. It appears that the Examiner attempts to replace an antenna (11) of Matsumoto et al. having straight waveguide antenna part (12) and C-shaped or spiral-shaped curved portion (12a) with a plurality of annular waveguides (43, 44) of Suzuki et al. However, the Examiner's alleged combination fails to teach or suggest all the claim elements. In

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particular, the apparatus resulting from the alleged combination of Matsumoto et al. and Suzuki et al. does not disclose, among other things, a proximal end portion and a terminal end portion since the annular waveguides of Suzuki et al. do not have proximal and terminal end portions (see Col. 27, line 58 - Col. 28, line 1, and Col. 28, lines 39-43). In addition, regarding independent claim 15, neither Matsumoto et al. or Suzuki et al. discloses, among other things, a connecting waveguide having a closed terminal end portion and a plurality of side apertures for supplying the microwaves to each of the waveguides. The Examiner appears to allege that the introducing ports (54, 55) of Suzuki et al. correspond to the recited plurality of side apertures of a connecting waveguide. However, the connecting waveguide (5) of Suzuki et al. does not disclose a closed terminal end. At least for this reason, the combination of Matsumoto et al. and Suzuki et al. fails to anticipate independent claim 15. Thus, the first criterion for a proper *prima facie* case of obviousness has not been met.

In response to the Applicant's argument submitted on July 30, 2002, the Examiner continues to assert that the apparatus resulting from the alleged combination of Matsumoto et al. and Suzuki et al. can have the recited plurality of antenna waveguides of the claimed invention. As Applicant has previously pointed out in the last response, the combined apparatus of Matsumoto et al. and Suzuki et al. cannot simultaneously include both a plurality of substantially ring-shaped antenna waveguides and the antenna waveguides having proximal and terminal end portions because the plurality of substantially ring-shaped antenna waveguides are elements in the antenna of Suzuki et al. while the proximal and terminal end portions are elements in the antenna of Matsumoto et al. That is, the plurality of substantially ring-shaped antenna

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waveguides and the antenna waveguides having proximal and terminal end portions are mutually exclusive, as disclosed. At least for this reason, the alleged combination is considered to be based on an improper hindsight reasoning that requires unreasonable, imaginative constructions to arrive at the claimed invention. For example, according to the Examiner's alleged combination, one must place two antenna (11) of Matsumoto et al. concentrically arranged with respect to one other and, somehow, rearrange the connecting waveguide (21) to separately supply microwaves to the proximal end portion of each antenna. Not only does the cited references fail to teach or suggest such imaginative constructions, but it is also unclear as to why one of ordinary skill in the art would have been motivated to modify the apparatus of Matsumoto et al. to have the apparatus as alleged by the Examiner. The Examiner merely alleges that the motivation to combine the references is "to provide uniform microwave radiation intensity distribution." However, Matsumoto et al. already achieves the uniform microwave introduction into the chamber with any modifications. See, for example, page 3, lines 16-22, 33-38, 42-46. Therefore, the Examiner's alleged motivation cannot be the motivation to combine the apparatuses of Matsumoto et al. and Suzuki et al. Applicant, once again, respectfully submits that the Examiner must read prior art references without the hindsight gained from the instant disclosure. When read this way, the combination of Matsumoto et al. and Suzuki et al. cannot have a plurality of antenna waveguides of Matsumoto et al. for the reasons set forth above.

As to the second criterion, there is no suggestion or motivation in the aforementioned references to combine or modify the teachings of the references. The improperness of the Examiner's alleged motivation (i.e., "to provide uniform microwave

radiation intensity distribution”) has been fully addressed above. In addition, the Examiner continues to assert that the combination would “allow microwaves to radiate over a large area and for a relatively uniform intensity distribution.” Such alleged motivations, however, are only applicable to Suzuki et al. That is, while the problem addressed by Suzuki et al. is to provide a gas supply means for producing a layer of a high density plasma which is uniform, of a large area, and thin, the problem addressed by Matsumoto et al. is to suppress the size of a microwave plasma process apparatus to be installed in a small space even when the size of a reactor is large. Therefore, one of ordinary skill in the art would not have been motivated to combine the teachings of Suzuki et al. for producing a layer of a high density plasma and with the teachings of Matsumoto et al. to arrive at the claimed invention. Thus, the second criterion for a proper *prima facie* case of obviousness also has not been met.

In response to Applicant’s argument filed on July 30, 2002 regarding this second criterion, the Examiner asserts that the difference in problem solving areas between the two cited references “does not alter the motivation to combine the two references since the references are analogous.” The Examiner further asserts that “[b]oth references have the same field of endeavor which is microwave plasma processing systems.” The MPEP § 2141.01(a) sets forth that the Examiner must determine what is “analogous prior art” for the purpose of analyzing the obviousness of the subject matter at issue. “In order to rely on a reference as a basis for rejection of an applicant’s invention, the reference must either be in the field of applicant’s endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.”

In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). In this

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case, the Examiner merely asserts that Matsumoto et al. and Suzuki et al. are analogous art because they have the same field of endeavor, i.e., microwave plasma processing system. In response, Applicant respectfully submits that the art of microwave plasma processing system is a broad, "crowded" field within which can have a number of different problem solving areas. Each of Matsumoto et al. and Suzuki et al., though commonly related to a microwave plasma processing system, addresses a unique, different problem solving area from each other, as discussed above. Thus, one skilled in the art would not have considered Matsumoto et al. and Suzuki et al. as "analogous art" and would not have been motivated to combine the teachings of Suzuki et al. for producing a layer of a high density plasma and with the teachings of Matsumoto et al. to arrive at the claimed invention.

Finally, as to the third criterion, not only does the combination of cited prior art references fail to teach or suggest the claimed invention, the combination does not show a reasonable expectation of success, because it is unclear as to how the plurality of annular waveguides (43, 44) of Suzuki et al. could be incorporated into the device of Matsumoto et al. with respect to the connecting waveguide (21). As becomes clear, the connecting waveguide (21) of Matsumoto et al. is connected to the waveguide antenna part (12) of the antenna (11) radially in the same plane. However, the microwave introducing ports (54, 55) of Suzuki et al. are disposed on the upper surface of the antenna. When the purported combination is viewed without the hindsight gained from the instant application, it is clear that the combination would not only be unsuccessful, but likely impossible. In addition, the teaching or suggestion to make the claimed combination and the reasonable expectation of success is not found in the cited

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references. Therefore, the third criterion for a proper *prima facie* case of obviousness also has not been met.

In response to the Applicant's argument filed on July 30, 2002, the Examiner, relying on In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981), asserts that "the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." The Examiner appears to assert that, by citing the case, the Examiner is exempt from the burden of satisfying the required criterion of "reasonable expectation of success" for *prima facie* obviousness. Applicant respectfully points out that the legal concept of *prima facie* obviousness is a procedural tool of examination which applied broadly to all arts. It allocates who has the burden of going forward with production of evidence in each step of the examination process. See In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976). That is, the Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, Applicant is under no obligation to submit evidence of nonobviousness. In this case, the Examiner has failed to establish the "reasonable expectation of success" criterion for a proper *prima facie* case of obviousness. Nor has the Examiner provided a proper reasoning or evidence as to why such establishment of a *prima facie* case of obviousness can be omitted.

At least for these reasons set forth above, Applicant respectfully submits that a proper *prima facie* case of obviousness has not been established and respectfully request reconsideration and withdrawal of this ground of rejection. Thus, the present claims define non-obvious subject matter over Matsumoto et al. in view of Suzuki et al.

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## CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that the claimed invention is neither anticipated by nor rendered obvious over the prior art references cited against this application. Applicant, therefore, requests reconsideration of this application and the timely allowance of all pending claims.

Attached hereto is a marked-up version of the changes made to the specification and claims 1, 8, and 17 by this amendment.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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## APPENDIX TO AMENDMENT

### IN THE CLAIMS:

1. (Twice Amended) A microwave plasma processing system comprising:
- a processing vessel;
- an antenna for introducing microwaves into said processing vessel, the antenna having a plurality of substantially ring-shaped and substantially concentric antenna waveguides [which are substantially concentrically arranged], each of said antenna waveguides having a substantially rectangular radial cross-section and comprising a proximal end portion, a terminal end portion, and [a rectangular waveguide having] a wall [in which] having a plurality of slots [are] formed at [intervals] a predetermined interval;
- a microwave supply source for supplying said microwaves to said antenna; and
- a connecting waveguide for connecting said microwave supply source to said proximal end portion of each of said antenna waveguides,
- wherein a plasma is produced in said processing vessel by said microwaves introduced from said antenna.

8. (Twice Amended) A microwave plasma processing system comprising:
- a processing vessel having a microwave transmittable top wall;
- an antenna for introducing microwaves into said processing vessel, the antenna being mounted on said top wall of said processing vessel and having a plurality of substantially ring-shaped and substantially concentric antenna waveguides which are substantially concentrically arranged, each of said antenna waveguides having a

substantially rectangular cross-section and comprising a proximal end portion, a terminal end portion, and [a rectangular waveguide having] a bottom wall [in which] having a plurality of slots [are] formed at [intervals] a predetermined interval;

a microwave supply source for supplying said microwaves to said antenna; and  
a connecting waveguide for connecting said microwave supply source to said proximal end portion of each of said antenna waveguides,

wherein a plasma is produced in said processing vessel by said microwaves introduced from said antenna.

17. (Amended) A microwave plasma processing system as set forth in claim 15, wherein each of the antenna waveguides has a substantially rectangular radial cross-section and includes [a rectangular waveguide having] a bottom wall [in which] having a plurality of slots [are] formed at [intervals] a predetermined interval.

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